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RESTORATION OF OIL AND GAS WELL-SITES IN SOUTHEASTERN OHIO

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Restoration of Oil and Gas Well-Sites in Southeastern Ohio

by

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INTRODUCTION

As the drilling of new wells increased over the years, so did disturbances to the land. To address these concerns, the Division of Oil and Gas was formed in 1965 within the Ohio Department of Natural Resources to regulate all oil and gas well activities (Ohio Department of Natural Resources Division of Oil and Gas, 1985). The division ensures that precautions are taken to protect the resources, the environment, and the safety of the general public.

The state of Ohio enacted statutes and regulations for the oil and gas industry to follow, based on the industry's accepted practices. The oil and gas statutes and regulations are recorded in Chapter 1509 of the Ohio Revised Code.

As with any new law, adherence is a slow process. The oil and gas industry has cooperated with the majority of the laws, but some are still violated. One law, in particular, involves well-site restoration. Since the author of this undergraduate thesis is interested in a career in the oil and gas industry, he has focused on this violation. Specifically, the information within is a cause and effect analysis of the three major problems concerning restoration of oil and gas well-sites in southeastern Ohio.

This project was undertaken to partially fulfill requirements of a Bachelor of Science degree in geology at The Ohio State University in Columbus, Ohio. Under the supervision of Doctor Garry McKenzie, research was conducted and information gathered through visits to the Ohio Department of Natural Resources and oil and gas well-sites in southeastern Ohio, and sources from the Orton Hall Library at The Ohio State University. This information was compiled during the three month period April to June, 1986.

RESTORATION--A DEFINITION

Well-site restoration is a tedious process that may actually take several years to fully complete. The main objective of restoration is to restore all land disturbed by drilling activities to its previous condition. The laws governing oil and gas well-site restoration as set forth by the Ohio Revised Code Chapter 1509 are as follows: within six months after the completion of a producing well, the operating company (1) shall fill all pits for containing muds, cuttings, saltwater, and oil that are not needed for production purposes, (2) remove all concrete bases, drilling supplies, and drilling equipment, (3) shall grade or terrace and plant, seed, or sod the area disturbed that is not required in the production of the well, where necessary to bind the soil and prevent substantial erosion and sedimentation, (4) saltwater and oil shall be periodically drained or removed and properly disposed of from any pit that is retained so the pit is kept reasonably free of saltwater and oil. Naturally, once a well has ceased production the remaining land must be restored according to the previous laws (Ohio Department of Natural Resources Division of Oil and Gas, 1979).

Although the laws are not difficult to obey, they are among the most violated of all oil and gas laws (Oral communication, Robert Rothwell, Deputy Chief, Ohio Division of Oil and Gas, April 17, 1986). Violations of (1), (3), and (4) above are the most frequent and are mainly due to the time and expense involved. The following are the three major problems associated with oil and gas well-site restoration according to the Ohio Department of Natural Resources (ODNR). They are listed in the order in which they will appear in this thesis: (1) conservation of topsoil, (2) drilling permit adherence, (3) saltwater disposal (Oral communication, Robert Rothwell, Deputy Chief, Ohio Division of Oil and Gas, April 17, 1986).

CONSERVATION OF TOPSOIL

Well-site restoration actually begins the moment the well-site is constructed. The well-site is prepared by the drilling company by clearing a space large enough to efficiently contain the drilling equipment. This process entails clearing the space of all vegetation, leveling the surface, and digging a pit. Site preparation is usually hastily done the day before drilling is to commence so the preparer does not take the time to save the topsoil.

The fertile, dark-colored surface soil is of vital importance to further restoration. Once a well is completed, the disturbed land not required for production activities must be restored. The topsoil, however thin the layer may be, contains nutrients, organic material, and other elements which favor germination and growth of grass and legumes. The subsoil, which normally remains after site construction, is usually more acidic and contains fewer nutrients to help vegetation get established (Ohio Federation of Soil and Water Conservation Districts, 1985). Vegetation will re-establish ground cover to control water runoff and erosion.

Due to the rough topography in the eastern half of Ohio where drilling is concentrated, the potential for excessive erosion is tremendous. Drilling activity may also disturb important drainage patterns or create drainage problems. It is clear that to re-establish vegetation and thus to reduce soil loss it is necessary to properly plan, construct, and restore well-sites.

It has often been said, "An ounce of prevention is worth a pound of cure." When topsoil is stockpiled, restoration is quicker, simpler, and less expensive. The stockpiling and then spreading of topsoil during restoration may be the best method of improving success in reseeding (Ohio Federation of Soil and Water Conservation Districts, 1985). Since topsoil

contains many nutrients and is high in organic matter, it is more productive than the subsoil and is a perfect medium for establishing a grass and legume cover. Topsoil is too valuable to be discarded during well-site construction.

DRILLING PERMIT ADHERENCE

The basis of Chapter 1509 of the Ohio Revised Code (O.R.C.) is the permit system. By law, any company or individual must apply and obtain a permit before drilling a new well or altering an existing one. The Division of Oil and Gas receives, processes the applications, and issues the permits (Ohio Department of Natural Resources Division of Oil and Gas, 1985). In regard to restoration, the permit must contain a plan for the restoration of all disturbed land. According to section 1509.072 of the O.R.C., "No oil or gas well owner or his agent shall fail to restore the land surface within the area disturbed in siting, drilling, completing, and producing a well."

Once an application for a permit is issued to an applicant, the Field Enforcement Section of the Division of Oil and Gas is responsible for inspecting and supervising the well activities on location. The field enforcement staff ensures that permit holders comply with the approved procedures stated on their permit (Ohio Department of Natural Resources Division of Oil and Gas, 1985).

The main problem of drilling permit adherence concerning restoration is two-fold. First, with approximately 42,000 wells in Ohio in 1980 there simply are not enough inspectors to sufficiently monitor restoration. Secondly, an inspector does not have the permit in hand while inspecting a well-site, so he does not know whether of not the restoration was completed according to plan (Oral communication, Robert Rothwell, Deputy Chief, Ohio Division of Oil and Gas, April 17, 1986).

Since inspectors do not monitor the restoration as the work is done, and since they go on location without the permit in hand, operating companies cut costs and do not restore the site according to their original plan. This "new" plan generally entails grading the surface with no consideration to topsoil or drainage patterns and a mere scattering of seed. With the topsoil virtually buried, the chances of establishing a vegetation cover are greatly reduced. If there is no vegetation cover, soil is lost through erosion and drainage patterns can be drastically altered.

A resolution to this frequent problem is not difficult. The state of Ohio will not allocate more money to hire more inspectors so the current inspectors must be more efficient and must be given more authority. The Division of Oil and Gas should make copies of all permits and send them to the inspector who will monitor the respective well. An inspector, once informed of a restoration plan, can knowingly judge the adherence to restoration plans. If a plan is not followed, the inspector should be allowed to shut down the operation until the problem is remedied. Coal mine inspectors have the authority to cease an operation and it is the opinion of the Division of Oil and Gas that well inspectors should be given the same privilege in order to enhance drilling permit adherence (Oral communication, Robert Rothwell, Deputy Chief, Ohio Division of Oil and Gas, April 17, 1986).

SALTWATER DISPOSAL

Brine is a saltwater remnant from epeiric seas that once covered Ohio. Brine is deep in the earth, but brought to the surface by drilling activities. Information required by and supplied to the Division of Oil and Gas shows the amount produced in Ohio to be in the realm of 40,000 to 50,000 barrels per day (Noble, 1986). According to current Ohio law, no pit may be used for the ultimate disposal of saltwater. Saltwater and oil should be drained

or removed and properly disposed of, from any pit that is retained, so the pit is kept reasonably free of saltwater and oil (Ohio Department of Natural Resources Division of Oil and Gas, 1979). As part of the drilling permit issued by the O.D.N.R., an operating company must specify a plan for saltwater disposal.

The major concern in southeastern Ohio is that many operating companies still use unlined pits for saltwater disposal. The Ohio General Assembly thought it disposed of the brine problem last year when it enacted legislation phasing out the use of earthen holding pits, more tightly regulating brine shipment and disposal, and increasing penalties for brine dumping (Lore, 1986). To seemingly adhere to the law, many companies hire contract truckers to haul the brine away and dispose of it properly. Unfortunately, the truckers indiscriminately dump the brine onto roads or into streams (Boster, 1967).

The effects on the natural ground-water regime caused by the disposal of saline water are of major concern to the public and the petroleum industry. While the effect of saline water entering surface streams is serious, its entry into a ground-water body may be even more serious due to the extremely slow ground-water movement, which prolongs the life of the contamination. The effects of ground-water contamination may appear in a number of ways, including making the ground water unfit for domestic and industrial consumption and, where the water table is shallow, vegetation may be killed and soil rendered unproductive (Shaw, 1966).

There are currently two methods of saltwater disposal, neither of which is without problems. First, where climate is favorable, lined, non-overflowing evaporation pits may be effective in brine disposal. These are constructed by lining the pits with bentonite clay or a plastic sheet to create a hydraulic seal between the water in the pit and the ground.

Considerable doubt may be raised concerning the effectiveness of such pits to evaporate their waters to the atmosphere, especially in humid climates such as Ohio (Boster, 1967). Secondly, the brine can be collected in a non-corrosive container and trucked away or it can be drained directly from the bottom of the oil-storage tank and trucked away. Once the brine is hauled away, it can be disposed of by annular disposal, injection wells, or by dumping it on county roads for ice removal purposes. Annular disposal seeks to return brine to its original deposits by putting it down between well casings. State officials say the casings leak and brine gets into ground-water aquifers, thus the technique should be phased out over a five-year period (Lore, 1986). Problems associated with injection wells include, the added expense of such an operation, clogging of the well, and lack of an effective horizon to inject the brine (Boster, 1967). Brine used for county snow and ice removal, a practice allowed by the 1985 brine control bill, is ineffective because the brine is eventually absorbed by the subsurface and may contaminate the ground water. Currently, state officials are attempting to classify brine as a hazardous waste material, which would limit disposal options and require drillers and brine haulers to prepare detailed manifests on all brine shipments (Lore, 1986).

Fieldwork: In May, 1986, eleven oil and gas well-sites in Muskingum County, Ohio were visited. These wells were randomly selected by being spotted while driving in the county. These producing wells were older, thus conservation of topsoil and drilling permit adherence were not detected. These wells represented standard saltwater disposal practices and common disposal violations.

Of the eleven wells visited, an improper saltwater disposal method, unlined pits, was observed at four. Proper brine disposal was found at

the remaining seven wells. The proper methods included annular disposal, collection of brine in a hard, plastic container, and pit-free sites where saltwater was taken directly from oil-storage tanks and hauled away by truck.

The unlined pits were full of stagnant saltwater and crude oil. One pit had overflowed into a drainage ditch. A severe repercussion of this reprehensible act was immediately noticed. There was no vegetation in the immediate vicinity of the pits. Although ground-water contamination was not investigated, it more than likely exists.

Although annular disposal is frowned upon by state officials, it is not uncommon at well-sites. Pumping saltwater down the annulus not only returns brine to its original deposits, it also helps keep tubing, rods, and casing free of paraffin.

Although it can be costly, having brine trucked away is one of the major means of brine disposal (Shaw, 1966). Once the brine is drained from plastic containers or oil-storage tanks, the operator has fulfilled its responsibility. Unfortunately, the truckers do not always dispose of brine properly. While fieldwork was conducted, no evidence of improper brine dumping was detected.

Upon completion of fieldwork, the permits of the four wells found in violation of state legislature enacted in 1965 prohibiting the use of unlined pits were checked at the O.D.N.R. The permits stated that brine would be hauled away by tank truck.

An Actual Case of Ground-water Contamination: Ground-water contamination by brine introduced at the surface in Morrow County, Ohio exceeded the U.S. Public Health drinking water standards. The bulk of the contamination occurred in the vicinity of oil production. Most of the contamination is thought to be directly related to petroleum exploration and production.

The major contributors to contamination were saltwater evaporation pits and indiscriminate dumping of saltwater by contract truckers (Shaw, 1966).

FILING COMPLAINTS

In the event the disturbed land surface is not restored according to the plan stated in the drilling permit, any person affected can file a complaint with the Chief of the Ohio Division of Oil and Gas. The chief investigates the problem and sends a report to the owner and complaining party. Any violation must then be eliminated within a specified time or the county prosecuting attorney or the Attorney General will be asked to take action. If the chief fails to act to secure compliance within twenty days after the specified time, the complaint filer may notify the county prosecuting attorney.

If the well owner fails to comply with the chief's demands, the chief may declare any surety bond filed to ensure compliance with the restoration plan forfeited in an amount set by rule of the chief. The chief then certifies forfeiture to the Attorney General.

Basically, there is a good relationship between well operators and the O.D.N.R. so there generally is compliance with the rules and laws. The Division of Oil and Gas feels it lacks the power to properly enforce the laws. The division would like the authority to shut down an operation in the event of a violation. Complaints could more properly be handled directly by the Attorney General because the courts, who consider oil and gas law violations insignificant, are not eager to hear the cases. The Attorney General would take immediate action to secure compliance and the whole process of filing complaints would be quicker and easier and would not have to concern the courts (Oral communication, Robert Rothwell, Deputy Chief, Ohio Division of Oil and Gas, April 17, 1986).

CONCLUSION

According to Ohio law, all land disturbed by drilling activities must be restored to its previous condition. Unfortunately, the laws governing this process are violated. The major problems concerning well-site restoration in southeastern Ohio are topsoil conservation, drilling permit adherence, and saltwater disposal.

Drilling companies hastily prepare well-sites and do not stockpile the topsoil. The topsoil contains nutrients, organic material, and other elements which favor germination and growth of grass and legumes. To reestablish vegetation and thus to reduce soil loss due to erosion, topsoil should be stockpiled and spread during restoration.

Due to the increasing number of wells in Ohio, there are not enough well inspectors to sufficiently monitor restoration. Wells are inspected without the knowledge of the restoration plan so drilling permit adherence is a problem. If the Division of Oil and Gas would send the inspectors copies of all permits then adherence could be monitored more closely.

Saltwater disposal has been a major concern of the petroleum industry in recent years. Saltwater destroys surface streams and contaminates ground water, making it unfit for domestic and industrial consumption and killing vegetation. Saltwater may be properly disposed of in lined evaporation pits or it may be trucked away and disposed of by annular disposal, injection wells, or by dumping it on county roads for snow and ice removal. Any method of disposal has problems and state officials are currently working to rectify such problems.

It is general knowledge that violations of Ohio oil and gas laws exist, but it is not known as to whom to contact to have the problems corrected. The Ohio Division of Oil and Gas handles all complaints. After an investigation, the division notifies the well owner. If the well owner does not

correct the problem within a specified amount of time, the division turns the investigation over to the county prosecuting attorney or the Attorney General for immediate action. Due to the courts' apathy towards oil and gas law violations, the division prefers action by the Attorney General.

The Ohio Division of Oil and Gas feels that new oil and gas laws need to be enacted and existing laws altered. The division seeks more authority for its inspectors so as to sufficiently uphold the law. Given the proper authority and stricter restoration laws with more severe penalties, the division feels the future outlook for well-site restoration is good. Currently, the division enjoys a good relationship with well operators and foresees those relations as improving as compliance with the laws is pursued.

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